

# **Appendix J**

## **MINIMUM FLOWS AND LEVELS RECOVERY AND PREVENTION STRATEGY**



## OVERVIEW

Appendix J is a compilation of portions of the *Lower East Cost Regional Water Supply Plan* (LEC Plan) regarding the establishment of Minimum Flows and Levels (MFL) and recovery and prevention strategies. This document should be read in the context of the entire plan.

Section 373.0361, Florida Statutes (F.S.), requires that each regional water supply plan be based on at least a 20-year planning period and include (a) water supply and water resource development components, (b) a funding strategy for water resource development projects, (c) MFLs established within the planning region, (d) a MFL recovery and prevention strategy, and (e) technical data and information supporting the plan. Pursuant to this statute, the LEC Plan includes MFLs for specified water bodies and recovery and prevention strategies for those water bodies that are exceeding or are expected to exceed the proposed criteria.

As one of the tools for plan implementation, rulemaking to implement the regulatory recommendations of the LEC Plan will constitute a significant effort during the next several years. Rulemaking will include water reservations and numerous Consumptive Use Permitting (CUP) criteria, which are interrelated and cumulatively define the availability of water for consumptive uses and water resource protection. As a result, it is recommended in the LEC Plan that certain rulemaking efforts be grouped in phases to allow for the cumulative analysis of the water resource and consumptive use implications of the regulatory program.

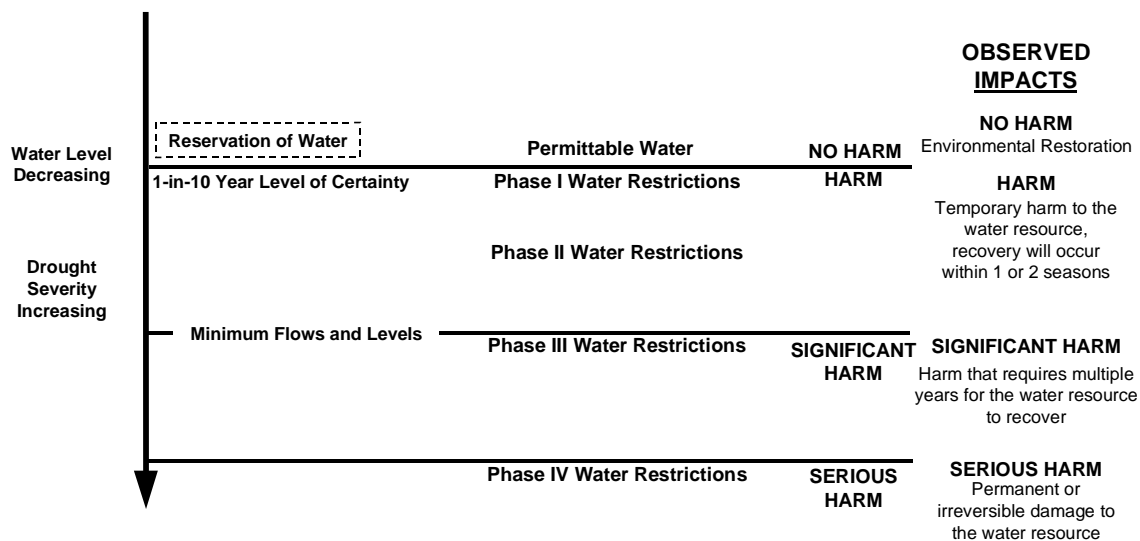
Another goal of the rulemaking schedule is to adopt rules as the technical information becomes available. As a result, it is recommended in this plan that initial rulemaking proceed for concepts that were sufficiently identified and evaluated in the planning process. These include establishment of MFLs for the Everglades, Lake Okeechobee, the Biscayne Aquifer, and the Caloosahatchee River.

In addition, uncertainties in the rulemaking process, such as delays for development of supporting technical data or rule challenges, may conflict with the proposed schedule for rule development provided in this plan. The proposed schedule will be adapted to account for such delays, while considering the need to develop associated rules through a coordinated rulemaking process. The contingency process identified in the plan, along with input from the LEC Regional Water Supply Plan Advisory Committee, other members of the public, and the Governing Board may be used to identify necessary changes to the rulemaking schedule.

In developing MFL recovery and prevention strategies it is essential that the role of MFLs under Chapter 373, F.S., be identified. This South Florida Water Management District (District, SFWMD) developed the LEC Plan based on a resource protection framework that helps identify the role of MFLs in relation to other tools implemented under the statute. These concepts provide the basis for the proposed recovery and prevention strategies.

The overall goal of Chapter 373 is to ensure the sustainability of water resources of the state (Section 373.016, F.S.). Chapter 373 provides the District with several tools to carry out this responsibility. These tools have various levels of resource protection standards. Water resource protection standards in Chapter 373 must be applied together as a whole to meet this goal. Pursuant to Parts II and IV of Chapter 373, surface water management and CUP regulatory programs must prevent ***harm*** to the water resource. MFLs must be set at the point at which further withdrawals could cause ***significant harm*** to the water resources or ecology of the area. Water shortage statutes, on the other hand, dictate that permitted water supplies must be restricted in a manner that prevents ***serious harm*** from occurring to the water resources. Other protection tools include reservation of water for fish and wildlife, or health and safety (Section 373.223[3]), and aquifer zoning to prevent undesirable uses of the ground water (Section 373.036).

The levels of impacts cited above, harm, significant harm, and serious harm, are relative resource protection terms. Each plays a role to help achieve the ultimate goal, which is to achieve a sustainable water resource. The role of MFLs is shown conceptually in **Figure J-1**.



**Figure J-1.** Conceptual Relationship Among the Harm, Serious Harm, and Significant Harm Standards.

Section 373.0421, F.S., requires that once the MFL technical criteria have been established, the Districts must develop and expeditiously implement a recovery and prevention strategy for those water bodies that are currently exceeding, or are expected to exceed, the MFL criteria. Section 373.0421(2), F.S., provides the following in relevant part:

The recovery or prevention strategy shall include phasing or a timetable which will allow for the provision of sufficient water supplies for all

existing and projected reasonable-beneficial uses, including development of additional water supplies and implementation of conservation and other efficiency measures concurrent with to the extent practical, and to offset, reductions in permitted withdrawals, consistent with the provisions of this chapter.

It is possible that the proposed MFL criteria cannot be achieved immediately, because of the lack of adequate regional storage and/or ineffective water distribution infrastructure. These storage and infrastructure shortfalls will be resolved through water resource development and water supply development projects, construction of facilities, and improved operational strategies that will increase the region's storage capacity and improve the existing delivery system. Planning and regulatory efforts will, therefore, include a programmed recovery process that will be implemented over time to improve water supply and distribution to protect water resources and functions. The recovery process includes the following:

- Necessary structural solutions for the recovery and prevention plan will be provided in the form of a list of projects. The list will include the timing and funding requirements for each project. **Table J-1** provides a list of the various water resource development projects identified in the LEC Plan that will provide water to meet the proposed MFL targets and water reservations. **Table J-1** also includes anticipated completion dates of these projects. In addition, **Tables 53, 54, and 55** of the LEC Plan provide the amounts of water projected to be delivered to each area by components to meet the proposed MFLs.
- If necessary to prevent the MFL criteria from being exceeded, demand management cutbacks for recovery during drought conditions will also be identified (e.g., phased water shortage restrictions to prevent significant or serious harm). The LEC Plan does not propose the use of the Water Shortage Plan as a MFL recovery strategy. However, when a drought occurs, the District will rely upon the Water Shortage Plan, as necessary, to address regional water availability. This strategy is discussed below.
- To the extent practicable, the District shall implement water deliveries to reduce or prevent the MFL criteria from being exceeded. Operational guidelines necessary for implementation of water supply deliveries to achieve MFLs, in concert with meeting other required water demands, will be identified. However, water deliveries to prevent the MFL criteria from being exceeded will be given priority consideration over deliveries for other purposes.
- Before considering reduction in permitted withdrawals in a recovery and prevention strategy, all practical means to prevent reductions in available water supplies for consumptive use shall be explored and implemented. When determining whether reductions in existing legal uses are required, the following factors shall be considered:

- The extent of MFL shortfall directly caused by existing legal uses
- The practicality of avoiding the need for reductions in permitted supplies, including structural and operational measures, by maximizing the beneficial uses of the existing water source
- The risk of significant harm resulting from the existing legal use in the interim period before the recovery strategy is fully implemented

**Table J-1.** Water Resource Development Projects that Provide Water Supplies Associated with MFL Recovery Plans and Water Reservations.

Water Body	Basis of Reservation	Water Supply Development Projects	Year Water Reservation Rule Will Be Developed <sup>a</sup>
Everglades National Park	Rain-driven/ Stage formula	Everglades Construction Project	2005
		Modified Water Deliveries to Everglades National Park	2005
		C-111 Operational Modifications <sup>b</sup>	2005
		L-31 Levee Improvements	2010
		WCA-3A and WCA-3B Seepage Management	2010
		Decomartmentalize WCA-3A, Phase I	2010
		Decomartmentalize WCA-3A, Phase II	2020
		West Miami-Dade County Reuse (50 MGD)	2020
		Central Lake Belt Storage Area (92,160 ac-ft)	2021
WCAs and Everglades National Park	Rain-driven/ Stage formula	EAA Storage Reservoir, Compartment 1 (180,000 ac-ft)	2010
		EAA Storage Reservoir, Compartment A (120,000 ac-ft)	2010
		EAA Storage Reservoir, Compartment B (60,000 ac-ft)	2015
		Taylor Creek/Nubbins Slough Reservoir (50,000 ac-ft)	2010
		Lake Okeechobee ASR, Phase 1 (500 MGD)	2015
		Lake Okeechobee ASR, Phase 2 (1,000 MGD)	2020
		North of Lake Okeechobee Storage Reservoir	2015
St. Lucie Estuary	Salinity envelope criteria	C-44 Basin Storage Reservoir (30,000 ac-ft)	2010
Caloosahatchee Estuary	Salinity envelope criteria	C-43 Basin Storage Reservoir	2010
		C-43 Basin ASR (220 MGD)	2015
Stormwater Treatment Areas (STAs) <sup>c</sup>	Six-inch minimum depth	Lake Okeechobee Storage	2005
Loxahatchee River	Salinity envelope criteria	C-51 and Southern L-8 Reservoir	2015
		West Palm Beach Water Catchment Area ASR <sup>d</sup>	2015
Biscayne Bay Florida Bay	Salinity envelope criteria	Construction of S-356 Structures and Relocation of a Portion of L-31N Borrow Canal	2010
		South Miami-Dade County Reuse (131 MGD)	2020
		Central Lake Belt Storage Area (92,160 ac-ft)	2021
		North Lake Belt Storage Area (45,000 ac-ft)	2021

a. These dates to complete MFLs are taken from a letter from SFWMD to FDEP dated November 15, 1999.

b. C-111 Operational Modifications are part of the Modification to South Dade Conveyance System in Southern Portion of L-31N and C-111 Canals component

c. MFL criteria are not applicable to this water body.

d. The West Palm Beach Water Catchment Area ASR is part of the L-8 Project.

## **MFL PREVENTION STRATEGY THROUGH WATER SHORTAGE PLAN IMPLEMENTATION**

MFLs are the point at which further withdrawals would cause significant harm to water resources. Significant harm in the LEC Plan is defined as the level of harm that requires multiple years for the water resource to recover. This is considered to be more severe than the harm standard imposed in the CUP process, which relates to impacts that would occur through a 1-in-10 year drought. Therefore, MFLs in a recovered natural system would not be exceeded until conditions had already exceeded the 1-in-10 year drought level of certainty criteria. Beyond the 1-in-10 year drought level of certainty, when MFLs are being approached, the District will impose water shortage declarations to curb consumptive use withdrawals.

Pursuant to Section 373.246, F.S., water shortage declarations are designed to prevent serious harm from occurring to water resources. Serious harm, the ultimate harm to the water resources that was contemplated under Chapter 373, F.S., can be interpreted as long-term, irreversible, or permanent impacts to the water resource. MFLs are associated with significant harm, which is considered to be less severe than serious harm. As a result, MFLs will act as triggers for imposing water shortages.

The District has implemented its water shortage authority by restricting consumptive uses based on the concept of shared adversity between users and the water resources (Chapter 40E-21, Florida Administrative Code [F.A.C.]). Under this program, different levels or phases of water shortage restrictions with varying levels of severity are imposed relative to the severity of drought conditions. The four phases of current water shortage restrictions are based on progressively increasing resource impacts leading up to serious harm. Under the District's program, Phase I and II water shortages primarily reduce water use through conservation techniques and minor use restrictions, such as restrictions on car washing and lawn watering. Phases III and IV, however, require use cutbacks that are associated with some level of economic impact to the users, such as the potential for crop damage due to agricultural irrigation restrictions.

Staff proposes that Phase III, or severe cutbacks in consumptive use withdrawals, which are required under the Water Shortage Program, occur when MFLs are projected to be exceeded (**Figure J-1**). As a prevention strategy, MFLs will be directly incorporated into the Water Shortage Rule, Chapter 40E-21, F.A.C., Water Shortage Triggers.

## **MFLS FOR SPECIFIC WATER BODIES**

### **Meeting MFL Criteria for Lake Okeechobee**

Significant harm criteria developed for Lake Okeechobee were based on the relationship between water levels in the lake and the ability to a) protect the coastal aquifer against saltwater intrusion, b) supply water to Everglades National Park, c) provide littoral zone habitat for fish and wildlife, and d) ensure navigational and

recreational access. Consideration was also given to the lake's function as a storage area for supplying water to adjacent areas such as the Everglades Agricultural Area (EAA), the Seminole Indian Tribe, the Caloosahatchee and St. Lucie basins, and the Lake Okeechobee Service Area.

### **Water Supply Planning MFL Criteria**

Water levels should not fall below 11 ft NGVD for more than 80 days duration, more often than once every six years, on average (SFWMD, 2000a).

### **Meeting MFL Criteria for the Everglades**

Technical relationships considered for developing MFL criteria for the Everglades included the effects of water levels on hydric soils and plant and wildlife communities, and frequency and severity of fires. Impacts associated with significant harm include increased peat oxidation, frequency of severe fires, soil subsidence, loss of aquatic refugia, loss of tree islands, and long-term changes in vegetation or wildlife habitat. The proposed minimum water level criteria for the Everglades were based on protecting the two dominant soil types found within the ecosystem as follows:

#### **MFL Criteria for Peat-Forming Wetlands**

Water levels within wetlands overlying organic peat soils within the WCAs, Rotenberger and Holey Land wildlife management areas, and Shark River Slough (Everglades National Park) shall not fall below ground surface for more than 30 days and shall not fall below 1.0 foot below ground for one day or more of that 30-day period, at specific return frequencies for different areas, as identified in **Table 44, Chapter 4** of the Planning Document of the LEC Plan.

#### **MFL Criteria for Marl-Forming Wetlands**

Water levels within marl-forming wetlands that are located east and west of Shark River Slough, the Rocky Glades, and Taylor Slough within Everglades National Park, shall not fall below ground surface for more than 90 days and shall not fall below 1.5 feet below ground for one day or more of that 90-day period at specific return frequencies for different areas, as identified in **Table 44, Chapter 4** of the Planning Document of the LEC Plan.

### **Meeting MFL Criteria for the Biscayne Aquifer**

Criterion for the Biscayne aquifer were developed based on analysis of technical relationships among ground water levels and canal water levels, and the potential for saltwater intrusion. Harm occurs when the saltwater interface moves further inland than has occurred historically due to seasonal water level fluctuations, up to and including a 1-in-10 year drought. Significant harm occurs when saline ground water moves inland to



an extent that it limits the ability of users to obtain fresh ground water in the amounts specified in their permits and will require several years for the freshwater source to recover.

The proposed criteria do not address the ground water base flows to Biscayne Bay or Florida Bay. Data are presently being collected to define MFLs for these water bodies.

### **Biscayne Aquifer Minimum Level**

The term minimum level for the Biscayne aquifer refers to water levels associated with movement of the saltwater interface landward to the extent that ground water quality at the withdrawal point is insufficient to serve as a water supply source for a period of several years before recovering. For evaluation of model simulations, operational criteria are applied to the coastal canals that receive regional water. **Table J-2** provides the minimum canal operational levels for eleven primary water management structures. To meet the operational criteria, the canal stage cannot fall below the levels for more than 180 days, and the average annual stage must be sufficient to allow levels and chloride concentrations in the aquifer to recover to levels that existed before a drought or discharge event occurred. See **Figure J-D-4** in **Appendix D** for an example of the model output for this performance measure.

**Table J-2.** Minimum Canal Operation Levels of Coastal Canals.

<b>Canal/Structure</b>	<b>Minimum Canal Operation Levels to Protect Against MFL Violations (ft NGVD)</b>
C-51/S-155	7.80
C-16/S-41	7.80
C-15/S-40	7.80
Hillsboro/G-56	6.75
C-14/S-37B	6.50
C-13/S-36	4.00
N.N. River/G-54	3.50
C-9/S-29	2.00
C-6/S-26	2.50
C-4/S-25B	2.50
C-2/S-22	2.50

### **Meeting MFL Criteria for the Caloosahatchee Estuary**

The proposed Caloosahatchee Estuary MFL criteria is based on maintaining freshwater base flows to the upper reaches of the Caloosahatchee Estuary, which will prevent excessive salinity levels in the estuary from causing significant harm to

submerged aquatic vegetation and fish and invertebrate communities. Research data were used to relate freshwater flow rates to salinity distributions along the Caloosahatchee River and to correlate biologic community responses to varying salinity conditions. These relationships were established for submerged aquatic vegetation, fish, and invertebrates with major emphasis on the salinity requirements of the freshwater grass *Vallisneria* (commonly known as tape grass or eel grass). It was determined that the distribution and abundance of *Vallisneria* at a location 30 kilometers upstream of Shell Point is the best biological indicator for addressing freshwater flow needs for the restoration of the Caloosahatchee Estuary. The magnitude of die-off, combined with the frequencies of die-off events, and the resulting impact to fisheries resulting from the loss of *Vallisneria* habitat formed the basis of the proposed MFL criteria.

### **Proposed Estuary Minimum Flow Criteria**

Low freshwater flows, when sustained, cause an increase in salinity, that result in die off of *Vallisneria* to less than 20 shoots per square meter as measured at a monitoring station located 30 kilometers upstream of Shell Point during the months of February through April. Significant harm to the Caloosahatchee Estuary is considered to occur when these freshwater grasses die back due to high salinity from low freshwater inflows for three years in succession. Harm to the Caloosahatchee Estuary is considered to occur when freshwater grasses die back due to high salinity from low freshwater inflows, for two consecutive years. The freshwater inflow needed to prevent harm or significant harm is an average of 300 cubic feet per second (cfs) per day at the S-79 structure during the months of February through April.

## **MFL RECOVERY AND PREVENTION STRATEGIES FOR SPECIFIC WATER BODIES**

Pursuant to the requirements of the MFL statute, analyses of current and future conditions were conducted for each of the priority water bodies where MFLs were defined. When the evaluation showed MFLs are not or will not be met in the future, recovery or prevention strategies, as appropriate, were developed. Following are the MFL recovery/prevention strategies for Lake Okeechobee and the Everglades. The evaluations showed that MFLs for the Biscayne aquifer are expected to be met and, therefore, a recovery/prevention strategy was not required.

### **Lake Okeechobee**

Analysis of the results of the 1995 and 2020 base cases show MFL criteria were met. As a result, the MFL criteria would probably not be exceeded even if the LEC Plan were not implemented. Therefore, a recovery plan is not required for Lake Okeechobee. The prevention strategy consists of implementation of the Water Shortage Plan, including supply-side management, as simulated in the LEC Plan.

## Caloosahatchee River and Estuary

Analyses of both the 1995 and 2020 base cases show the proposed MFL criteria for the Caloosahatchee Estuary would be exceeded. Therefore, a recovery plan is necessary. Evaluation of the model results show that while the Caloosahatchee Estuary MFL criteria were exceeded, sufficient quantities of water remained left in Lake Okeechobee to avoid significant harm to the Caloosahatchee Estuary until the proposed long-term regional storage facilities that comprise the recovery plan have been built. These regional storage facilities are recommended in LEC Plan and *Caloosahatchee Water Management Plan* (CWMP) (SFWMD, 2000b, including Aquifer Storage and Recovery (ASR) and regional surface water reservoirs.

Long-term evaluations conducted for both the *Central and Southern Florida Project Comprehensive Review Study Final Integrated Feasibility Report and Programmatic Environmental Impact Statement* (Restudy) and the CWMP indicate that both MFLs and minimum restoration flows (300 cfs during the spring) can be met through a combination of the construction of reservoirs and limited deliveries from Lake Okeechobee and ASR systems located within the basin. Over the next five years, activities for construction of regional facilities include (a) implementation of the ASR pilot project, (b) development of the Project Implementation Report (PIR) for the C-43 Regional Surface Water Reservoir, and (c) completion of the Southwest Florida Study. The reservoir and ASR projects are scheduled for completion in 2010 and 2015, respectively (**Table J-1**).

In the period of time prior to construction of these facilities, the District will utilize water in Lake Okeechobee, when available, for releases to the Caloosahatchee River to prevent MFL violations, which are projected to occur only during extreme droughts. In implementing this interim recovery and prevention strategy, releases to prevent significant harm will occur as follows: if a die-back of *Vallisneria* grass beds occurs in the area identified in the MFL criteria during one year, for at least one of the following two years, an average of 300 cfs of water will be delivered at the S-79 structure during the months of February through April.

## The Everglades and Water Conservation Areas

Two general types of impacts (direct and indirect) can occur within the Everglades and WCAs that can be attributed to consumptive use withdrawals. Indirect impacts occur as a result of making regional water deliveries to areas other than the Everglades. Direct impacts result from the pumping of adjacent wellfields that lower the water table along the eastern edge of the Everglades system, affecting wetlands located directly west of the north-south perimeter levee.

In an effort to define which areas of the Everglades may potentially be affected by existing and projected future water demands, District staff utilized the South Florida Water Management Model (SFWMM) to identify where the proposed MFL criteria were not met for the 1995 and 2020 base cases. Review of the 1995 Base Case showed the proposed

Everglades MFL criteria were exceeded at 12 out of 19 locations (indicator regions) within the remaining Everglades system (**Table 45 in Chapter 4**). Evaluation of the 2020 base case showed similar results (**Table 45 in Chapter 4**), with no overall increase in the number of sites that exceeded proposed MFL criteria compared to the 1995 Base Case. These results indicate two things. First, a MFL recovery plan will be necessary for the 12 indicator regions identified in this modeling effort. Second, the instances in which the MFL criteria were exceeded were, for the most part, caused by drainage impacts associated with construction and operation of the Central and Southern Florida (C&SF) Project, while some areas may be influenced by a consumptive use withdrawal.

The next step taken was to conduct additional modeling to determine which areas of the Everglades may be affected by consumptive use withdrawals. The following preliminary screening analysis was conducted to identify these areas. The SFWMM simulated two scenarios using the assumptions in the LEC-1 simulation: (1) all LEC public water supply wellfields were turned on in the model, versus (2) all LEC public water supply wellfields were turned off in the model. These are referred to as the Pumps On and Pumps Off scenarios. Modeling results were evaluated using the set of environmental performance measures described in **Chapter 4** and **Appendix D** of this report and are similar to those used in the Comprehensive Everglades Restoration Plan (CERP) evaluation process.

Results of the Pumps On and Pumps Off scenarios revealed five indicator regions within the Everglades system that were potentially susceptible to impacts from public water supply withdrawals, as shown in **Table J-3**. With the wellfields turned off, improvements were observed in the number of times the MFL criteria were exceeded and the duration of the flooding, and a reduction was observed in the number of extreme low water events. These areas included (1) the Rockland marl marsh (11 percent difference in annual flooding); (2) eastern WCA-3B (six percent difference in annual flooding); (3) WCA-2B (five percent difference in annual flooding); (4) Northeast Shark River Slough (three percent difference in annual flooding), and (5) WCA-1, which showed an improvement in annual flooding (two percent), as well as significant reduction in the number of times the MFL criteria were exceeded. These preliminary results suggest that these five areas of the Everglades system have the potential to be impacted by water supply withdrawals to a limited degree.

Cutting off all public water supply wellfields was not considered practicable, due to the limited benefits to the regional system as projected in the model results balanced against (a) the cost of source replacement, (b) the potential water resource impact of large-scale Floridan aquifer development necessary to replace surficial supplies, and (c) long time frames to develop such sources. These factors were also considered against the fact that the CERP planning process has already provided consensus based alternatives to meet the recovery goals of South Florida's natural systems. For these reasons, staff proceeded to model a more realistic consumptive use withdrawal scenario that incorporates assumptions based on the District's current water shortage policy.

This modeling effort was basically a sensitivity analysis to identify the relative magnitude of impact that a 30 percent cutback in public water supply might have on the

**Table J-3.** Summary of the LEC Water Utility Pumps On and Pumps Off Scenarios for Selected Everglades Sites<sup>a</sup> for the 2020 Base Case.

Area	Gage	IR <sup>b</sup>	Number of Times MFL Criteria Were Exceeded <sup>c</sup>	Inundation/Duration Summary <sup>c</sup>			Number of Extreme Low Water Events <sup>c</sup>
				Number of Flooding Events <sup>c</sup>	Duration (weeks) <sup>c</sup>	Percent Increase in Annual Flooding <sup>c</sup>	
Loxahatchee National Wildlife Refuge (WCA-1)	1-7	27	7/1	20/18	74/84	92/94 (2%)	5/1
WCA-2A	2A-17	24	8/7	18/16	80/92	90/92 (2%)	8/9
WCA-2B	central	23	7/6	15/14	93/104	86/91 (5%)	8/6
Holey Land WMA <sup>d</sup>	HoleyG	29	5/5	11/11	140/140	96/96	5/5
Rotenberger WMA	Rotts	28	22/22	38/38	34/34	79/79	20/20
Northwest corner of WCA-3A	3A-NW	22	10/8	22/21	68/72	92/94 (2%)	8/6
Northwestern WCA-3A	3A-2	20	11/11	27/25	52/57	87/88 (1%)	10/8
Northeastern corner of WCA-3A	3A-3	68	10/8	19/17	76/85	90/90	8/8
Northeastern WCA-3A	3A-NE	21	8/7	17/15	88/101	92/94 (2%)	9/8
Central WCA-3A	3A-4	17	10/10	25/24	57/59	88/88	9/9
Southern WCA-3A	3A-28	14	8/7	17/18	88/83	93/93	5/7
WCA-3B	3B-SE	16	15/11	29/20	46/72	83/89 (6%)	19/12
Northeastern Shark River Slough	NESRS-2	11	9/7	20/18	71/82	88/91 (3%)	9/10
Central Shark River Slough	NP-33	10	7/7	15/13	100/117	93/94 (1)	7/8
Southwestern Shark River Slough	NP-36	9	8/6	15/15	98/100	91/93 (2)	11/9
Marl wetlands east of Shark River Slough	NP-38	70	15/13	61/61	15/16	58/59 (1%)	NA <sup>e</sup>
Marl wetlands west of Shark River Slough	NP-201	12	9/8	36/31	36/43	80/82 (2)	20/20
Rockland Marl Marsh	G-1502	8	24/19	40/40	19/23	46/57 (11%)	31/25
Taylor Slough	NP-67	1	16/16	38/36	30/32	71/72	28/28

a. Sites selected based on their potential for impact by a LEC wellfield withdrawal

b. IR = Indicator Region

c. First number in each box represents utility **Pumps On (full water use)**; second number represents **Pumps Off (a 30% cutback in water use by Miami-Dade County)**

d. WMA = Wildlife Management Area

e. NA = Not applicable

five areas identified above. The sensitivity analysis was conducted with the SFWMM simulating (a) all LEC public water utilities pumps turned on; and (b) all LEC utilities turned on, with Miami-Dade County's wellfields reduced by 30 percent (the level of cutback associated with Phase II water shortage restrictions). The purpose of this analysis was to see if simply implementing a water shortage cutback could reduce the number of times the MFL criteria was exceeded prior to the construction of the CERP projects. Modeling results were evaluated using the standard set of environmental performance measures developed for the LEC Plan (**Chapter 4** and **Appendix D**). These included review of (a) the number of times the MFL criteria were exceeded during the 31-year simulation period, (b) stage hydrographs and stage duration curves, (c) the number of

flooding events and their duration, (d) the percent reduction or increase in annual flooding, and (e) the number of extreme high and low water events. Results are presented below in **Table J-4** for the 2005 simulation and in **Table J-5** for the LEC-1 Revised simulation.

### 2005 Incremental Simulation with a 30 Percent Cutback

For the 2005 incremental simulation, three areas were identified that showed hydrologic differences between the two modeling scenarios. These areas were (1) the Rockland marl marsh located with Everglades National Park (Indicator Region 8), (2) Northeast Shark River Slough (Indicator Region 11), also located in Everglades National Park, and (3) southeast WCA-3B (Indicator Region 16). All three of these sites are located within the extreme western portion of urbanized Miami-Dade County (**Table J-4**). The impacts of the 30 percent cutback to the other two areas were not measurable.

**Table J-4.** Results of the Model Simulation for Selected Everglades Sites<sup>a</sup>: 2005 versus 2005 with a 30 Percent Cutback in Public Water Supply Withdrawals for Miami-Dade County.

Area	IR <sup>b</sup>	Number of Times MFL Criterion Was Exceeded <sup>c</sup>	Inundation/Duration Summary <sup>c</sup>			Number of High Water Events <sup>c</sup>	Number of Low Water Events <sup>c</sup>	Average Duration of Low Water Events <sup>c</sup> (weeks)
			Number of Flood Events <sup>c</sup>	Average Duration (weeks) <sup>c</sup>	Percent Change in Annual Flooding <sup>c</sup>			
Loxahatchee National Wildlife Refuge (WCA-1)	27	5/5	21/21 (3)	71/71	92/92	5/5	4/4	3/3
WCA-2A	24	14/14	23/23	60/60	86/86	0/0	16/16	5/5
WCA-2B	23	16/16	25/24	48/50	74/74	23/22	21/21	9/9
Northwestern WCA-3A	22	14/14	34/33	40/42	85/85	0/0	16/15	6/6
Northeastern WCA-3A	21	12/12	17/17	83/83	87/87	3/3	12/12	6/6
Central WCA-3A	17	8/8	17/17	88/88	93/93	5/5	8/7	4/4
Southern WCA-3A	14	1/2	10/8	158/198	98/98	19/17	1/0	1/0
WCA 3-B	16	10/10	21/19	68/76	88/90 (2%)	5/5	13/12	4/3
Northeastern Shark River Slough	11	11/11	23/20	61/72	87/89 (2%)	14/13	12/11	6/6
Central Shark River Slough	10	11/11	22/22	66/66	90/90	2/2	12/13	5/5
Southwestern Shark River Slough	9	10/10	20/21	71/68	89/89	0/0	16/16	4/4
Rockland Marl Marsh	8	21/20	35/37	27/26	58/60 (2%)	0/0	26/27	13/12
C-111 Perrine Marl Marsh	4	NA <sup>d</sup>	81/79	10/10	49/50 (1%)	0/0	43/48	34/30
Mid-Perrine Marl Marsh	3	NA <sup>d</sup>	48/48	18/18	52/53 (1%)	0/0	31/28	4/4
Taylor Slough	1	16/16	38/38	30/30	71/72 (1%)	1/1	27/27	4/4

a. Sites selected based on their potential for impact by a LEC wellfield withdrawal

b. IR = Indicator Region

c. First number in each box represents utility **Pumps On (full water use)**; second number represents **Pumps Off (a 30% cutback in water use by Miami-Dade County)**

d. NA = Not applicable

Review of stage hydrographs and stage duration curves for each of these three sites showed very minor differences in performance between the Pumps On and the 30 Percent Cutback modeling scenarios. Differences in performance between the two model simulations were small and included (a) a two percent improvement in hydroperiod (annual flooding), (b) a small increase in the number of continuous flooding events, and (c) a decrease in the number of times the MFL criteria were exceeded for the Rockland marl marsh recorded under the 30 Percent Cutback scenario (**Table J-4**). The improvements identified under the 30 Percent Cutback scenario are very close to or within the assumed confidence limits of the SFWMM and, therefore, may not be significant.

It should also be noted that this modeling scenario implements a 30 percent, year-round cutback for Miami-Dade County for the 31-year simulation. It is unlikely the District would impose a 30 percent cutback in public water supply for Miami-Dade County during wet periods or under normal rainfall conditions. The only time a 30 percent cutback would actually be in effect would be during a major drought period. Therefore, impacts or improvements to Everglades wetland hydrology observed under an actual 30 percent cutback scenario may be considerably less than those shown in **Table J-4**.

### **LEC-1 Revised Simulation with a 30 Percent Cutback**

By 2020, most of the CERP water supply and natural system restoration projects will be built and operating. Comparison of the Pumps On and the 30 Percent Cutback scenarios showed that only two areas have experienced hydrologic differences by 2020. These areas were (1) the Rockland marl marsh (Indicator Region 8) and mid-Perrine marl marsh (Indicator Region 3), each located within eastern portion of Everglades National Park (**Table J-5**).

The largest difference recorded was within the Rockland marl marsh where a three percent improvement in hydroperiod (average annual flooding) was observed under the 30 Percent Cutback scenario (**Table J-5**). In addition, a small decrease in the number of MFL criteria violations for the Rockland marl marsh was observed under the 30 Percent Cutback scenario. In the mid-Perrine marl marsh, a two percent improvement in hydroperiod and a small increase in the number of continuous flooding events was observed when the 30 percent cutback was imposed (**Table J-5**). Again, these results are close to the confidence limits of the SFWMM. It is unlikely the District would impose a 30 percent year-round cutback in public water supply for Miami-Dade County. Therefore, the observed differences between model simulations would more than likely be less than those presented in **Table J-5**.

These cutbacks did not show a significant reduction in the number of times the MFL criteria were exceeded, suggesting that a 30 percent cutback would not be effective in improving the MFL performance in the Everglades. As a result, the recommended MFL recovery program for the Everglades does not incorporate cutbacks of consumptive use permits.

**Table J-5.** Results of the Model Simulation for Selected Everglades Sites<sup>a</sup>: LEC-1 Revised versus LEC-1 Revised with a 30 Percent Cutback in Public Water Supply Withdrawals for Miami-Dade County.

Area	IR <sup>b</sup>	Number of Times MFL Criterion Was Exceeded <sup>c</sup>	Inundation/Duration Summary <sup>c</sup>			Number of High Water Events <sup>c</sup>	Number of Low Water Events <sup>c</sup>	Average Duration of Low Water Events <sup>c</sup> (weeks)
			Number of Flood Events <sup>c</sup>	Average Duration <sup>c</sup> (weeks)	Percent Change in Annual Flooding <sup>c</sup>			
Loxahatchee National Wildlife Refuge (WCA-1)	27	1/1	12/12 (3)	129/129	96/96	7/7	1/1	1/1
WCA-2A	24	8/8	13/13	112/112	91/91	5/5	11/11	6/6
WCA-2B	23	8/8	19/18	71/75	83/84 (1%)	21/22	12/12	8/7
Northwestern WCA-3A	22	6/5	27/20	56/76	94/95 (1%)	0/0	4/4	4/3
Northeastern WCA-3A	21	15/14	26/26	52/52	83/84 (1%)	7/7	17/19	5/4
Central WCA-3A	17	4/4	16/16	96/96	95/96 (1%)	2/2	5/5	3/3
Southern WCA-3A	14	4/5	11/12	140/128	95/95	3/3	4/4	3/3
WCA 3-B	16	3/3	10/10	154/155	96/96	13/16	3/3	3/2
Northeastern Shark River Slough	11	2/2	15/11	105/143	97/98 (1%)	8/10	2/3	3/2
Central Shark River Slough	10	2/2	9/10	175/158	98/98	3/3	2/2	3/2
Southwestern Shark River Slough	9	4/4	15/13	103/119	96/96	0/0	6/5	2/2
Rockland Marl Marsh	8	22/20	38/39	23/24	55/58(3%)	0/0	28/25	10/10
C-111 Perrine Marl Marsh	4	NA <sup>d</sup>	45/42	27/29	76/76	11/11	49/48	18/18
Mid-Perrine Marl Marsh	3	NA <sup>d</sup>	50/48	17/18	52/54 (2%)	0/0	34/33	4/4
Taylor Slough	1	16/16	37/36	31/32	71/71	5/5	28/28	4/4

a. Sites selected based on their potential for impact by a LEC wellfield withdrawal

b. IR = Indicator Region

c. First number in each box represents utility **Pumps On (full water use)**; second number represents **Pumps Off (a 30% cutback in water use by Miami-Dade County)**

d. NA = Not applicable

The District's current CUP criteria prohibits the issuance of permits that would cause harm to the water resources. As a result, in areas where the MFL criteria are being exceeded (significant harm occurring), no consumptive use permits could be issued that would cause an additional drawdown under the 1-in-10 year level of certainty. Consumptive uses that would cause an increase in the number of times the MFL criteria were exceeded within the Everglades would also not be permissible.

As a result of these factors, the main component of the MFL recovery plan for the Everglades is the construction and operation of the CERP and LEC regional water supply planning projects slated for completion between 2010 and 2020. In the interim, the plan recommends that the District conduct an annual assessment of the availability of water supply in regional storage available for releases to prevent the MFL criteria from being exceeded. To the degree practicable, the District's Governing Board shall authorize staff to make releases to prevent violations of the proposed MFL criteria.



With regard to the CUP process, no new uses or increased withdrawals, notwithstanding seasonal withdrawals for ASR storage that do not impact MFL criteria, that directly cause additional drawdowns beneath areas where MFL criteria are not met, will be permitted prior to the implementation of water resource development projects for recovery of these areas. The District will initiate rulemaking to reserve from allocation water intended for meeting hydropattern goals in the Everglades. These reservations will reflect initial limits on water availability in the regional system due to lack of storage, and will be revised or upgraded every five years, as needed, as CERP projects come on line. Finally, all CUP applicants will be required under District rule to demonstrate that their uses are efficient and consistent with the increase in water supplies as projects are implemented. To achieve this, the District will establish rules to further implement efficiency measures for use of water from the regional system, including criteria for capture of ASR water, and to limit by rule water allocations for new or increased cumulative demands from regional water supplies to five-year periods.

### **Specifics for Water Conservation Area 2B**

Results of regional modeling efforts performed as part of the LEC Plan identified WCA-2B as the only area of the northern Everglades that received a red score for all the incremental alternatives (2005, 2010, and 2015) and LEC-1 Revised, as well as for LEC-1. These results indicate this area of the Everglades fails to meet LEC regional water supply planning targets and ecosystem recovery is not likely to occur unless significant hydrologic improvements are made to the area. These results are similar to the modeling results recorded in Appendix D of the Restudy (USACE and SFWMD, 1999).

It is the intent of the LEC regional water supply planning process to implement the recommendations of the CERP's REcovery (REstoration, COordination, and VERification) teams to restore or improve Everglades hydropatterns within WCA-2B. The RECOVER teams will have the lead responsibility for identifying potential improvements in design or operations that will resolve any remaining performance problems currently predicted for both the CERP and the LEC Plan for this area of the Everglades Basin.

The approach, which will be used by the RECOVER teams to improve WCA-2B, will be to review and refine (where necessary) the performance measures and indicator regions used to evaluate hydrological performance. An increase in the number of indicator cells in WCA-2B may be required to better understand the nature of the hydrological performance problem and potential solutions. Once performance measures are reviewed, additional structural improvements and operational features will be suggested and modeled to determine potential solutions to WCA-2B performance. Once these improvements have been identified, they will be presented to the LEC Regional Water Supply Plan Advisory Committee and the District's Governing Board for review and approval and implemented as part of the 2005 LEC Plan.

## Biscayne Aquifer

Identified measures to prevent the MFL criteria from being exceeded for the Biscayne aquifer are as follows: 1) maintain coastal canal stages at the minimum operation levels shown in **Table J-2**; 2) implement CUP conditions for issuance to prevent harmful movement of saltwater intrusion up to a 1-in-10 year level of certainty; 3) maintain a ground water monitoring network and utilize data to initiate water shortage cutbacks should the threat of saline water movement become imminent; and 4) conduct research in high risk areas to identify where the position of the saltwater front is adjacent to existing and future potable water sources.

## MFL RECOMMENDATIONS

### **Recommendation 11: Biscayne Bay Minimum and Maximum Flow Targets**

#### **Discussion**

A major recommendation of the LEC Plan is to identify the freshwater flows that support the maintenance of environmentally desirable flow and salinity targets for Biscayne Bay. The completion of an ecological model for Biscayne Bay will complement the hydrodynamic model developed by the U.S. Army Corps of Engineers – Waterways Experiment Station (USACE-WES) and the ground water model developed for Biscayne Bay by the U.S. Geological Survey (USGS). The completion of these tools will enable scenarios of varying freshwater inflows to be evaluated, resulting in recommendations for a salinity regime.

#### **Subtasks**

- Task 11a. Interagency review of models, scenarios and standards
- Task 11b. Data processing
- Task 11c. Conduct secondary review
- Task 11d. Publish final report of recommended MFL technical criteria
- Task 11e. Develop a MFL recovery and prevention strategy for those areas that do not meet the proposed MFL criteria
- Task 11f. Conduct rule development and rulemaking

#### **Summary Information**

Cost: \$200,000 in FY 2001

FTEs: 2.2 through FY 2003

Funding Source: Florida Forever Act, Surface Water Improvement Management (SWIM) and CERP

Implementing Agencies: SFWMD, Miami-Dade County DERM, and USACE

**Table J-6.** Estimated Schedule and Costs for Developing Biscayne Bay Minimum and Maximum Flow Targets.

Recommendation Subtasks		Plan Implementation Costs (\$1,000s and FTEs)											
		FY01		FY02		FY03		FY04		FY05		Total 2001-2005	
		\$	FTE	\$	FTE	\$	FTE	\$	FTE	\$	FTE	\$	FTE
a	Interagency review		0.1		0.1								0.2
b	Data processing	200	0.5									200	0.5
c	Secondary review		0.2		0.1								0.3
d	Final report				0.5								0.5
e	Recovery plan/prevention strategy				0.5								0.5
f	Rulemaking						0.2						0.2
<b>TOTAL</b>		200	0.8		1.2		0.2					200	2.2

## Recommendation 35: Establish MFLs

### Discussion

Establish MFLs by rule by December 2000 for Lake Okeechobee, the Everglades and the WCAs, the Biscayne aquifer (north of the C-2 Canal), and the Caloosahatchee Estuary. Develop and establish MFLs for the Loxahatchee River and St. Lucie Estuary by 2001, for Florida Bay by 2003, and for Biscayne Bay and the southern coastal Biscayne aquifer by 2004. Funding and manpower estimates are associated with the rulemaking and peer review process only. Funding and manpower associated with data collection and research are incorporated as separate recommendations.

### Subtasks

Task 35a. Complete research on Biscayne Bay, Florida Bay, St. Lucie Estuary, and the southern coastal Biscayne aquifer

Task 35b. Finalize the MFL criteria development process

Task 35c. Incorporate proposed MFLs and recovery and prevention strategies into the rulemaking process consistent with the dates for establishment identified in **Table J-7**

Task 35d. Conduct public workshops on rule language, notice draft rule with FAW, and seek Governing Board authorization of rule

**Table J-7.** Target Dates for Establishing MFL and Reservation Rules.

Priority Water Body	Target Date for Establishment MFL Rule	Target Date for Establishment of Reservation Rule
Lake Okeechobee	December 2000	NA
Water Conservation Areas	December 2000	December 2003
Holey Land and Rotenberger WMAs	December 2000	December 2003
Everglades National Park	December 2000	December 2003
Rockland Marl Marsh in Everglades National Park	December 2005	December 2005
St. Lucie Estuary	December 2001	December 2001
Caloosahatchee River and Estuary	December 2000	December 2000
Stormwater Treatment Areas	NA	March 2001
Loxahatchee River	December 2001	December 2001
Biscayne Bay	December 2004	December 2004
Florida Bay	December 2003	December 2003
Biscayne Aquifer	December 2000	NA
Southern Biscayne Aquifer	December 2003	NA
Subregional Wetlands	NA	December 2003

### Summary Information

Cost: \$80,000 over five years (peer review and rulemaking process only)

FTEs: 1.3

Funding Source: SFWMD

Implementing Agency: SFWMD

**Table J-8.** Estimated Schedule and Costs for Establishing MFLs.

Recommendation	Plan Implementation Costs (\$1,000s and FTEs)											
	FY01		FY02		FY03		FY04		FY05		Total 2001-2005	
	\$	FTE	\$	FTE	\$	FTE	\$	FTE	\$	FTE	\$	FTE
Establish MFLs	40	0.5				0.3	40	0.5			80	1.3

## Recommendation 36: MFL Criteria for the Rockland Marl Marsh

### Discussion

Everglades National Park staff has suggested the proposed interim MFL criteria for the Rockland marl marsh may not sufficiently protect these wetlands from significant harm. Additional wetland research is proposed to confirm or refine the MFL return frequency criteria that will not cause significant harm to marl-forming wetland plant and animal communities. As part of the LEC regional water supply planning process, the District, Everglades National Park, and USGS staff will jointly develop a work plan to conduct the necessary research needed to confirm or refine the proposed MFL return frequency criteria for the Rockland marl marsh. This work will also help to determine appropriate levels for reservations of water.

### Subtasks

- Task 36a. Select an interagency working group, with public input, to develop the Rockland marl marsh MFL research plan
- Task 36b. Develop the draft research plan and have it independently peer reviewed by November 2001
- Task 36c. Once the research plan has been approved, the District will include its portion of the cooperative agreement in its 2002 budget for Governing Board approval
- Task 36d. Implement the research plan by September 2002 with a final report delivered to the District by July 2005

### Summary Information

Cost: \$115,000

FTEs: 0.5

Funding Source: SFWMD

Implementing Agencies: SFWMD, Everglades National Park, and USGS

**Table J-9.** Estimated Schedule and Cost for MFL Research for the Rockland Marl Marsh.

Recommendation	Plan Implementation Costs (\$1,000s and FTEs)											
	FY01		FY02		FY03		FY04		FY05		Total 2001-2005	
	\$	FTE	\$	FTE	\$	FTE	\$	FTE	\$	FTE	\$	FTE
MFL Research for the Rockland Marl Marsh	15	0.1	100	0.1		0.1		0.1		0.1	115	0.5

## **Recommendation 37: MFLs for Florida Bay**

### **Discussion**

In response to recommendations made by Everglades National Park staff, Florida Bay was placed on the District's Priority Water Body List for establishment in 2003. A sufficiency review of the necessary technical information needed to develop MFLs for Florida Bay has been completed and is under review. A number of research projects are currently under way that will provide data for developing initial MFLs for Florida Bay. In addition, conceptual models of Florida Bay are being developed by the CERP RECOVER Team and may be used as a starting point for developing MFL criteria for Florida Bay. The District expects to develop initial MFL criteria for Florida Bay by 2003.

### **Subtasks**

- Task 37a. Complete the MFL sufficiency review for Florida Bay
- Task 37b. Complete the work plan for Florida Bay MFL development
- Task 37c. Utilize existing research programs to collect the necessary stage, flow, and salinity data needed to establish flow-salinity relationships for Florida Bay
- Task 37d. Utilize existing salinity response information on seagrasses and evaluate high salinity response (up to 70 ppt) experiments in Key Largo mesocosms
- Task 37e. Finalize the development of conceptual models and use them as a starting point for the development of MFL criteria for Florida Bay
- Task 37f. Utilizing the above information, develop and publish initial MFL technical criteria for Florida Bay, and have this technical document peer reviewed by an independent scientific peer review panel by March 2003
- Task 37g. Establish initial MFLs (Phase 1) for Florida Bay by December 2003. Identify minimum flows and/or levels needed to prevent significant harm, and identify the amount of water needed to restore Florida Bay and establish a reservation of water to protect the ecosystem
- Task 37h. Develop a Florida Bay water quality model and incorporate trophic level responses
- Task 37i. Utilize water quality models to establish Phase 2 MFLs for Florida Bay by December 2006

### **Summary Information**

Cost: \$850,000

FTEs: 11.5

Funding Source: SFWMD

Implementing Agencies: SFWMD, Everglades National Park

**Table J-10.** Estimated Schedule and Cost for MFLs for the Florida Bay.

Recommendation	Plan Implementation Costs (\$1,000s and FTEs)											
	FY01		FY02		FY03		FY04		FY05		Total 2001-2005	
	\$	FTE	\$	FTE	\$	FTE	\$	FTE	\$	FTE	\$	FTE
MFLs for the Florida Bay	200	2.5	250	2.5	150	2.5	125	2.0	125	2.0	850	11.5

### **Recommendation 38: MFL Recovery Strategies**

Pursuant to the requirements of the MFL statute, analyses of current and future conditions were conducted for each of the priority water bodies where MFLs were defined. When the evaluation showed MFLs are not or will not be met in the future, recovery or prevention strategies, as appropriate, were developed. See Chapter 5, **page 227**, for a more detailed discussion of MFL recovery strategies.

#### **Subtasks**

- Task 38a. Complete the design, permitting, and construction of CERP related long-term recovery strategies
- Task 38b. Develop and implement operational protocols for releasing water from regional storage, as conditions warrant, to prevent the MFL criteria from being exceeded prior to implementation of long-term recovery measures. See Recommendations 33 and 34 for more information.
- Task 38c. Complete rulemaking that: a) defines regional water supply to coastal service areas during 1-in-10 year drought conditions consistent with environmental restoration and water resource development implementation schedules; b) addresses permit duration and limits on the amounts of reasonable new demands on regional water supply in five-year increments; c) establishes enhanced water conservation measures for water users; and d) establishes water reservations for the Everglades system.

#### **Summary Information**

Cost: \$200,000

FTEs: 1

Funding Source: SFWMD

Implementing Agencies: SFWMD

**Table J-11.** Estimated Schedule and Cost for MFL Recovery Strategies.

Recommendation	Plan Implementation Costs (\$1,000s and FTEs)											
	FY01		FY02		FY03		FY04		FY05		Total 2001-2005	
	\$	FTE	\$	FTE	\$	FTE	\$	FTE	\$	FTE	\$	FTE
MFL recovery strategies	75	0.2	50	0.2	25	0.2	25	0.2	25	0.2	200	1.0

## Recommendation 39: MFL Monitoring Systems

### Discussion

Monitoring systems must be established in order to implement MFL recovery and prevention strategies and conduct research necessary to further refine the ability to project when significant harm could occur. The monitoring systems will collect water flow, water level, and water quality data. Monitoring data is necessary to affect interim operational strategies and to gage the success of MFL long-term recovery and prevention strategies.

### Subtasks

- Task 39a. Identify appropriate locations within the LEC planning area to establish a long-term MFL monitoring network. Review and evaluate the location of current water management gages. Relocate and/or install appropriate lake, estuary, marsh, and canal gaging stations and associated telemetry within each identified MFL priority water body
- Task 39b. Develop an interactive database to collect and store MFL data that will provide water managers with real time information that can be used to make operational decisions
- Task 39c. Conduct field and laboratory research and monitoring programs designed to evaluate the effects of implementing the proposed MFL criteria proposed as part of this plan. Include both long-term and short-term projects that will evaluate the effects of the proposed criteria at scales ranging from laboratory studies to field monitoring at specific sites. Provide summaries of the results of this research for incorporation into the next update of the LEC Plan.



## Summary Information

Cost: \$550,000

FTEs: 1.5

Funding Source: SFWMD

Implementing Agencies: SFWMD

**Table J-12.** Estimated Schedule and Cost for Establishing a MFL Monitoring System.

Recommendation	Plan Implementation Costs (\$1,000s and FTEs)											
	FY01		FY02		FY03		FY04		FY05		Total 2001-2005	
	\$	FTE	\$	FTE	\$	FTE	\$	FTE	\$	FTE	\$	FTE
Establish a MFL Monitoring System	50	0.2	200	0.4	200	0.5	50	0.2	50	0.2	550	1.5

## REFERENCES

SFWMD. 2000a. *Draft Minimum Flows and Levels for Lake Okeechobee, the Everglades, and the Biscayne Aquifer*, Water Supply Department, Water Resources Management, South Florida Water Management District, West Palm Beach, FL.

SFWMD. 2000b. *Caloosahatchee Water Management Plan*. Water Supply Department, Water Resources Management, South Florida Water Management District, West Palm Beach, FL.

USACE and SFWMD. 1999. *Central and Southern Florida Flood Control Project Comprehensive Review Study Final Integrated Feasibility Report and Programmatic Environmental Impact Statement*. U.S. Army Corps of Engineers, Jacksonville District, Jacksonville, FL, and South Florida Water Management District, West Palm Beach, FL.

